Exam 5 Review

1. $(x-2)^2=5$

$x-2=\pm\sqrt{5}$

$\boxed{x=2\pm\sqrt{5}}$

2. $x^2+6x-5=0$ $\quad 6/2=3$ $\quad 3^2=9$

$x^2+6x=5$

$x^2+6x+9=5+9$

$(x+3)^2=14$

$x+3=\pm\sqrt{14}$

$\boxed{x=-3\pm\sqrt{14}}$

3. $2n^2=-8n-1$

$2n^2+8n+1=0$

$a=2 \quad b=8 \quad c=1$

$x=\dfrac{-8\pm\sqrt{8^2-4(2)(1)}}{2(2)}$

$x=\dfrac{-8\pm\sqrt{56}}{4}$

56 → 7, 8 → 2, 2, 2

$x=\dfrac{-8\pm 2\sqrt{14}}{4}$

$\boxed{x=-2\pm\frac{\sqrt{14}}{2}}$

4. $x^2+6x+10=0$

$a=1 \quad b=6 \quad c=10$

$x=\dfrac{-6\pm\sqrt{6^2-4(1)(10)}}{2(1)}$

$x=\dfrac{-6\pm\sqrt{-4}}{2}$

$x=\dfrac{-6\pm 2i}{2}$

$\boxed{x=-3\pm i}$

5. $x^2-5x+3=0$

b^2-4ac

$(-5)^2-4(1)(3)=13$ ← not a perfect square

Two different irrational solutions

6. $4x^2-12x+9=0$

b^2-4ac

$(-12)^2-4(4)(9)=0$

Exactly one rational solution

7. $10x^2-x-2=0$

b^2-4ac

$(-1)^2-4(10)(-2)=81$ ← perfect square

Two different rational solutions

8. $x^2+7=0$

b^2-4ac

$0^2-4(1)(7)=-28$

Two different imaginary solutions

9. ~~direct~~ $x=4i$ or $x=-4i$

$x-4i=0$ or $x+4i=0$

$(x-4i)(x+4i)=0$ ← difference of squares

$x^2-16i^2=0$

$x^2-16(-1)=0$

$\boxed{x^2+16=0}$

10. $s=16t^2+32t$

$229=16t^2+32t$

$16t^2+32t-229=0$

$t=\dfrac{-32\pm\sqrt{32^2-4(16)(-229)}}{2(16)}$

$t=\dfrac{-32\pm\sqrt{15680}}{32}$

$\boxed{t=2.9 \text{ sec}}$ or ~~-4.9~~

~~16.6 sec~~

11. $V = \frac{1}{3}\pi r^2 h$

$$\frac{V}{\frac{1}{3}\pi h} = \frac{\frac{1}{3}\pi r^2 h}{\frac{1}{3}\pi h}$$

$$\frac{3V}{\pi h} = r^2$$

$$r = \sqrt{\frac{3V}{\pi h}}$$

$$r = \sqrt{\frac{3V}{\pi h} \cdot \frac{\pi h}{\pi h}}$$ ← rationalize denominator

$$\boxed{r = \frac{\sqrt{3\pi Vh}}{\pi h}}$$

12. $f(x) = 2x^2 + 8x - 1$

$f(x) = (2x^2 + 8x) - 1$ $\quad 4/2 = 2$

$f(x) = 2(x^2 + 4x \quad) - 1$ $\quad 2^2 = 4$

$f(x) = 2(x^2 + 4x + 4) - 1 - 2(4)$

$f(x) = 2(x+2)^2 - 9$

$\boxed{\text{vertex: } (-2, -9)}$

— OR —

$$x = \frac{-b}{2a} = \frac{-8}{2(2)} = -2$$

$f(-2) = 2(-2)^2 + 8(-2) - 1 = -9$

$\boxed{\text{vertex: } (-2, -9)}$

13. $f(x) = x^2 + 5x + 3$

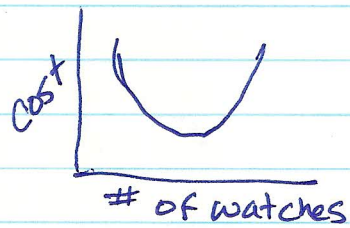
y-int ($x=0$): $f(0) = 0^2 + 5(0) + 3 = 3$

$\boxed{(0, 3)}$

x-ints ($y=0$): $0 = x^2 + 5x + 3$

$$x = \frac{-5 \pm \sqrt{5^2 - 4(1)(3)}}{2(1)} = \frac{-5 \pm \sqrt{13}}{2}$$

$$\boxed{\left(\frac{-5+\sqrt{13}}{2}, 0\right) \quad \left(\frac{-5-\sqrt{13}}{2}, 0\right)}$$

14. 

$C = 4x^2 - 216x + 73$

Vertex: $x = \frac{-b}{2a} = \frac{216}{2(4)} = 27$

$c(27) = 4(27)^2 - 216(27) + 73$

$= -2843$

He should sell 27 watches

The negative cost means he's making a profit.

15. $B = 5100(3)^x$

$x = 0$: $5100(3)^0 =$ **5100**

$x = 2$: $5100(3)^2 =$ **45,900**

16. $\log_2 8$ **3** "To what power must I raise 2 to get 8?"

17. $\log_5 \frac{1}{25}$ **−2** "To what power must I raise 5 to get 1/25?"

18. $3^{\log_3 17}$ ← The exponent to which I must raise 3 to get 17. Raising 3 to that exponent gives me **17**

19. $\log_8 8^3$ **3** "To what power must I raise 8 to get 8^3?"

20. $\log_3 81 = x$ **$3^x = 81$**

21. $64^{1/3} = 4$ **$\log_{64} 4 = 1/3$**

22. $\ln 82 = \boxed{4.4067}$

23. $e^5 = \boxed{148.4132}$

24. $\log 735 = \boxed{2.8663}$

25. $\log_5 31 = \dfrac{\log 31}{\log 5}$ or $\dfrac{\ln 31}{\ln 5} = \boxed{2.1337}$

26. $2^{(x+3)} = 32$
$2^{(x+3)} = 2^5$
$x+3=5$
$\boxed{x=2}$

27. $9^x = 27$
$(3^2)^x = 3^3$
$3^{2x} = 3^3$
$2x = 3$
$\boxed{x = 3/2}$

28. Center: $(0,0)$ radius: 5
$(x-0)^2 + (y-0)^2 = 5^2$
$\boxed{x^2 + y^2 = 25}$

29. Center: $(-3,2)$ radius: 8
$\boxed{(x+3)^2 + (y-2)^2 = 64}$

30. $x^2 + y^2 = 121$
$\boxed{\text{Center: } (0,0) \quad \text{radius: } 11}$

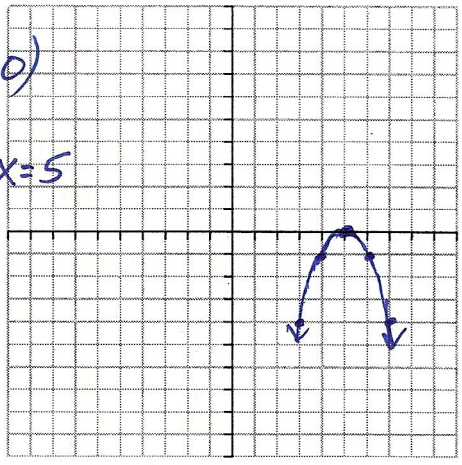
31. $(x+4)^2 + (y-7)^2 = 36$
$\boxed{\text{Center: } (-4,7) \quad \text{radius: } 6}$

32. $f(x) = -(x-5)^2$

↑ ↑ → 5

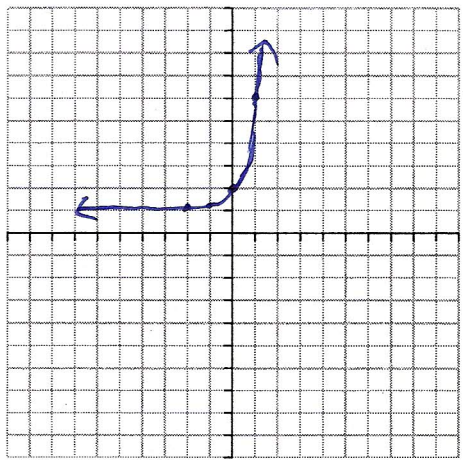
vertex: (5, 0)

axis of symmetry: $x = 5$



33. $y = 5^x + 1$

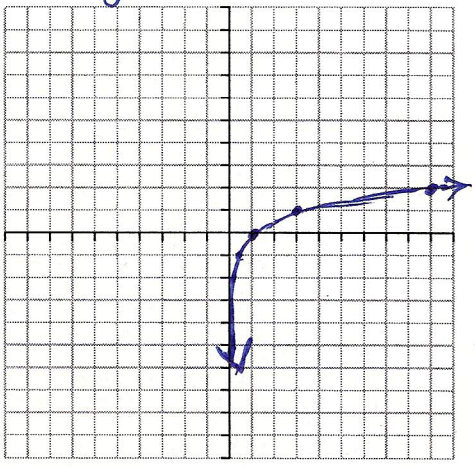
x	y
-2	1.04
-1	1.2
0	2
1	6



34. $y = \log_3 x$

$3^y = x$

x	y
1/9	-2
1/3	-1
1	0
3	1
9	2



35. $x^2 + (y+2)^2 = 9$

Center: (0, -2)

radius: 3